



Australian Government

Department of Education, Employment and Workplace Relations

ICTTEN6172A Design and configure an IP-MPLS network with virtual private network tunnelling

Release: 1

ICTTEN6172A Design and configure an IP-MPLS network with virtual private network tunnelling

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes, skills and knowledge required to design an internet protocol-multiprotocol label switching (IP-MPLS) network, examine MLPS data flow and configure virtual private network (VPN) tunnelling. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement but users should confirm requirements with the relevant federal, state or territory authority.
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Application of the Unit

Application of the unit	This unit applies to technical staff dimensioning an IP-MPLS Core Network for a carrier or an internet service provider (ISP). MPLS and VPNs are used to provide secure, reliable and fast IP services in technology convergence of data, voice and video. Relevant job roles include designer and installer of Next Generation Networks (NGN). These IP networks provide fast internet, voice over internet protocol (VoIP) and internet protocol TV (IPTV) services.
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan and design a IP-MPLS network to meet business requirements	1.1. Determine the IP-MPLS network design requirements in consultation with enterprise customer 1.2. Optimise factors affecting design 1.3. Use label stacking to route MPLS packets in the network to build of MPLS services 1.4. Dimension layer-3 generation of core backbone to allow MPLS IP-VPN to provide MPLS convergence services 1.5. Use MPLS control plane to set up wavelengths 1.6. Produce the design topology of a MPLS network to include the location and types of edge label switch routers (LSR) and core LSRs in agreement with enterprise customer
2. Configure a MPLS network and verify traffic engineering (TE) considerations	2.1. Configure edge and core LSRs to provide secure methods of transporting IP packets in the MPLS network using layer 2 protocols 2.2. Configure the LSRs to provide toll bypass for convergence of voice and data over the IP network 2.3. Classify traffic in MPLS terms and configure the Edge LSR to sort traffic into forward equivalent classes (FECs) 2.4. Install and remove the two standardised signalling protocols for managing traffic engineering (TE) of MPLS paths 2.5. Configure the MPLS-TE to provide routing on diverse paths to avoid congestion and guarantee bandwidth services
3. Configure a VPN and provide a virtual private LAN service (VPLS)	3.1. Configure a MPLS VPN tunnel for a customer network to provide multipoint-to-multipoint VPN connectivity 3.2. Build a content hosting server into a MPLS based VPN to produce a media network 3.3. Use virtual private LAN services (VPLS) as a VPN method for wide area network (WAN) multipoint-to-multipoint Ethernet connectivity spanning across multiple metropolitan areas 3.4. Produce a VPLS topology using an internet protocol IP-MPLS cloud with provider edge (PE) routers connecting VPLS domains associated with enterprise customer
4. Complete documentation	4.1. Produce a final design plan including network elements, configuration details and recommendations

ELEMENT	PERFORMANCE CRITERIA
	for design changes 4.2. Notify customer and obtain sign off

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- analytical skills to use complex technical data to develop network designs
- communication skills to consult with customers
- literacy skills to read and write reports
- numeracy skills to use binary systems
- project planning skills to set benchmarks and identify scope
- problem solving skills to solve a range of predictable network problems
- research skills to identify, analyse and evaluate broad features of a particular business domain and best practice in networking technologies including hardware and software to be installed
- technical skills to:
 - deploy multipoint-to-multipoint VPLS domains via IP-MPLS cloud
 - implement and verify routing information protocol (RIP), enhanced interior gateway routing protocol (EIGRP), open shortest path first (OSPF) and border gateway protocol (BGP) operations
 - implement MPLS architecture across a WAN environment
 - implement secure VPN tunnels across the MPLS network

Required knowledge

- current industry-accepted hardware and software products
- network operating systems and cabling standards
- networking technologies
- the customer business, domain, function and organisation effect on customer requirements and network equipment
- transmission technologies and protocols

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the ability to: - plan and design a MPLS network that meets business requirements - configure and test the MPLS network according to specified guidelines - produce appropriate documentation - implement secure VPN tunnelling.
Context of and specific resources for assessment	Assessment must ensure: - a live network and networked computers - network design documentation, equipment specifications and organisational guidelines - network components, routers, switches and multi-layer switches.
Method of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit: - direct observation of the candidate planning, designing and configuring a MPLS - review of documentation completed by the candidate - oral or written questioning of the candidate to assess required knowledge and skills.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example with: ICTTEN6216A Design and manage internet protocol TV in a service provider network. Aboriginal people and other people from a non-English speaking background may have second language issues. Access must be provided to appropriate learning and assessment support when required.

EVIDENCE GUIDE

	Assessment processes and techniques must be culturally appropriate, and appropriate to the oral communication skill level, and language and literacy capacity of the candidate and the work being performed. In all cases where practical assessment is used it will be combined with targeted questioning to assess required knowledge. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. Where applicable, physical resources should include equipment modified for people with special needs.
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Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Network design requirements may include:

- bandwidth
- firewalls
- gateway to wireless local area networks (WLAN)
- multi-layer switches
- number and type of core and edge routers
- number of channels
- protocols:
 - BGP
 - label distribution protocol (LDP)
 - OSPF
 - resource reservation protocol (RSVP)
- quality of service (QoS)
- security
- servers
- switches

RANGE STATEMENT

- | | |
|--|---|
| | <ul style="list-style-type: none">• throughput. |
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RANGE STATEMENT	
<i>Enterprise customer</i> may include:	• banks • clubs • external organisations • hospitals • internal departments • teaching institutions.
<i>Factors</i> may include:	• protocol incompatibility • QoS issues: • loss rate • latency • jitter • throughput • router availability.
<i>MPLS services</i> may include:	• any transport over MPLS (AToM): • 802.1Q - Ethernet VLAN • asynchronous transfer mode (ATM) • Ethernet • frame relay (FR) • high-level data link control (HDLC) • point-to-point protocol (PPP) • BGP MPLS VPN • Ethernet virtual circuit Ethernet over MPLS(EoMPLS) reroute link or node failure • link or node protection failure: • link resilience • node resilience • MVPN (multicast VPN) • QoS • traffic engineering: • bandwidth utilisation • capacity planning • congestion • virtual lines - toll bypass • VPLS.
<i>MPLS convergence</i> may include:	• ADSL cable • enterprise VoIP • FR-ATM transport • internet access

RANGE STATEMENT	
	• IPTV • VPN.
Network may include:	• data and voice • edge and core LSR • hosting servers for media content • internet • large and small LANs • national WANs • private lines • use of the public switched telephone network (PSTN) for dial-up modems only • VPNs • wireless.
Layer 2 protocols may include:	• ATM • Ethernet • FR • generic routing encapsulation (GRE) • packet over SONET (POS) • PPP.
Standardised signalling protocols may include:	• CR-LDP • RSVP-TE.

Unit Sector(s)

Unit sector	Telecommunications
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Telecommunications networks engineering
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